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Pressure Supply Pipes for Hydraulic Installations.

BY GEORGE J. HENRY, JR.

In the early days of utilizing water power, when the amount of power required was comparatively small and the fall but a few feet, to drive some local mill or machine shop, the old fashioned over or undershot wheel fulfilled the requirements to entire satisfaction. As industrial enterprises became larger, it was found necessary to enlarge these wheels to a point where their first cost and maintenance became very important items, and for meeting the rapidly increasing demand for high speed machinery it was necessary to greatly improve these low speed wheels so as to obtain very much higher machine speeds, resulting in excessive friction and wear and adding greatly to the expense and reducing the reliability of the installation. Considerable inventive power was therefore brought to bear on the problem of obtaining higher speed wheels for operating under higher pressures, and the hurdy-gurdy, which occupied a transition stage for a brief period of time, rapidly gave place to the well known tangential wheel, which has been developed through the past two decades into a prime mover of unusually high efficiency and reliability. Its wonderful possibilities and almost universally satisfactory application to the growing industrial requirements has forced the most careful consideration of pipe lines for suitably conveying the necessary water under high pressure for application to this type of wheel.

The problem of furnishing pipe lines for the development of water power calls for an entirely different treatment from those required merely for conveying of water. In the latter case, the entire amount of available pressure or head is to be utilized for the purpose of forcing the water through the pipe; and while, of course, it is necessary for the engineer to very carefully consider the location of the pipe with respect to the hydraulic grade line, and particularly the carrying capacity of the pipe, as it may be affected after long periods of installation by the age of the line, it is not necessary for him to reserve any more of the surveyed head than necessary to overcome these losses. When a pipe line is to be used, however, for the conveying of water for the development of power, it is obvious that by following the above practice there would be no energy left in the water to be transformed into power on the buckets of the wheel, this having been entirely utilized in conveying the water through the pipes. It is therefore necessary for us to use but a comparatively small percentage of the kinetic energy stored in the elevated water in forcing the water through the power pipe line; and in nearly every case the problem is not one of determining the cheapest piple for conveying the water, but a pipe line with the requisite safety factor, which, if made more costly, will not result in the delivery of a sufficient amount of additional power to net interest, depreciation and sinking fund charges on the additional investment; and one which, if made less costly, will waste in energy losses an amount of power which would net returns in excess of interest, depreciation and sinking fund charges on the amount of power so wasted. (Similarity to the "economy of copper" law in transmission circuits will be at once noticed.)

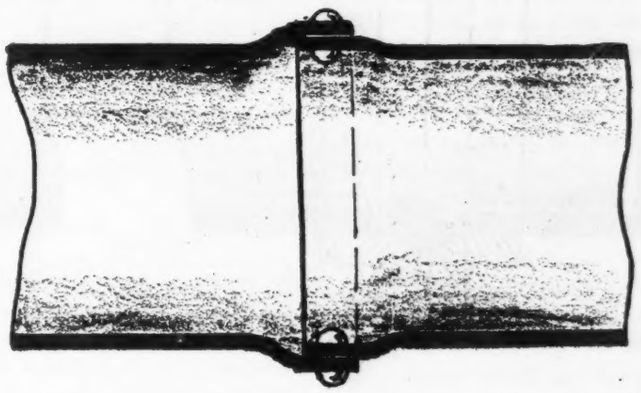

Fig- 1

The factors which enter into the determination of such a pipe line are of course very numerous. Various kinds of pipe may be employed; thus, under low pressures, wood pipe (especially of California redwood) will be found highly advantageous; the friction loss, where the velocity is sufficiently high to maintain a clean interior surface, being much less than where sheet steel riveted pipe is used especially if the latter be not well and smoothly coated

with asphalt compound on the interior surface, or if the water carries any chemicals in suspension which will affect the interior surface of the pipe.

The increasing loss, due to ageing, is not ordinarily taken into account in power lines, because as a rule the friction loss is but a small percentage of the entire head in any event; but as these lines are becoming larger and more expensive with the constant development going on in this field, it is a point that should receive more consideration. Wood pipe is not ordinarily applicable to heads above 200 feet, and in many cases not as high a head as this. After a pressure in the neighborhood of 200 feet, the amount of metal in the bands makes their cost almost comparable with sheet steel riveted line. Therefore, as the pressure increases, sheet steel riveted lines are found preferable to the wood stave pipe. A sheet steel riveted pipe line, however well made, has a waste of from 15 to 30 per cent. of material, due to the efficiency, or rather inefficiency of the best riveted joints, running from 70 per cent. to a little more than 80 per cent., depending upon the number and spacing of rivets.

Another point to often overlooked is the difficulty of maintaining the requisite strength in thick steel plates when rolled to comparatively small diameters. Thus it will be found that the thickness of material ordinarily employed in pipes of given diameters for maintaining the full plate and rivet joint strength, will be about as follow:

10-inch, 3-16-inch
11-inch, 3-16-inch
12-inch, 1-4-inch
13-inch, 5-16-inch
14-inch, 5-16-inch
15-inch, 3-8-inch
16-inch, 3-8-inch
17-inch, 3-8-inch
18-inch, 3-8-inch
19-inch, 7-16-inch
20-inch, 7-16-inch
21-inch, 7-16-inch
22-inch, 1-2-inch
23-inch, 1-2-inch
24-inch, 1-2-inch
25-inch, 9-16-inch
26-inch, 9-16-inch
27-inch, 9-16-inch
28-inch, 5-8-inch
29-inch, 5-8-inch
30-inch, 5-8-inch

Now let s be the ultimate strength of the plate per square inch;

f The percentage of strength of the rivet joint;
t The thickness of the plate in inches;
r The radius of the pipe in inches;
d The diameter of the pipe in inches;
p The pressure per square inch, due to the head or pressure of water, which is equal to $.4328h$;
h The vertical head or pressure in feet.

It will then be seen that the pounds' pull tending to burst the pipe will be rp and the ability of the plate in the pipe to resist rupture will be represented by sft.

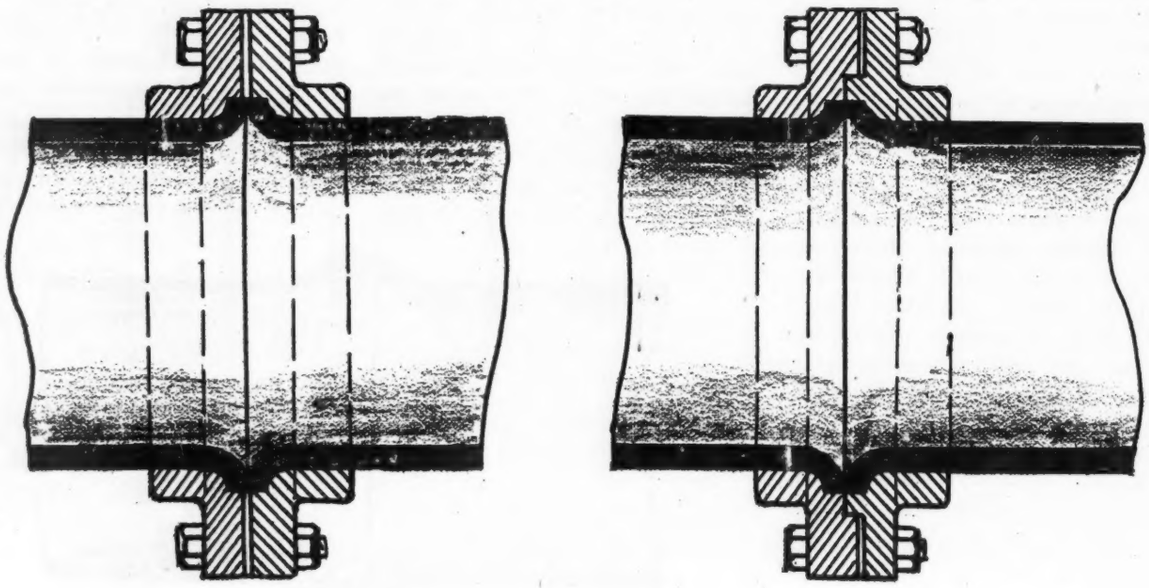

Fig - 2

Therefore, our safety factor will be $\frac{sft}{rp} = \frac{sft}{.216dh}$.

If now we have a plate having a tensile strength of 60,000 pounds per square inch and double rivet the horizontal seams in this, obtaining a rivet joint efficiency of 72 per cent., the safety factor will equal $\frac{43200t}{.216dh}$, whereas, for lap-welded pipe having an efficiency of 98 per cent. in the weld joint, we will have $\frac{58800t}{.216dh}$. Equating these two, we have $\frac{43200t}{.216dh} = \frac{58800t}{.216dh}$

or $\frac{t}{t} = \frac{58800}{43200} = \frac{1.34}{1}$, or 34 per cent. additional thickness will be required in the riveted line over that necessary in the lap-welded line, where equal safety is required. The percentage of increase in weight will be still higher on account of the lap-weld requiring no lap for the purpose of riveting.

If butt-joint pipe is used, the rivet joint efficiency will be higher; but the quanity of material will be incraesed at the joint on account of the special lap or butt-joint necessary.

If lap-welded pipe could be obtained in all thickness and diameters, it will be readily seen that it would be much the most economical pipe to use. Its costs, however, is prohibitive in medium diameters and light plates, and for that reason sheet steel riveted pipe is used so extensively. On the other hand, improved tools and methods of manufacture are causing this pipe to rapidly encroach on the field heretofor occupied almost exclusively by riveted pipes, and the readiness with which the lap-welded pipe may be installed in the trench and thoroughly tested in the factory before shipment are great advantages encouarging its adoption.

The common methods of connecting up high pressure pipe lines is by a roundabout rivet seam in the large sizes under heavy pressure. Where the diameter is so small as to make it impossible to work inside of the pipe, flanged joints are ordinarily used under high pressure, and under medium pressures collar and sleeve lead joints.

Where the pipe line is under comparatively low pressure, the material is too thin for properly caulking lead joint pipe, and the ordinary silp-joint pipe is almost invariably used. A very satisfactory joint is made in the larger sizes of lap-weld, called a "bump" joint or a "double bump" joint, as indicated in the cross-section sketch (Figure 1). Several other joints are shown in Figure 2, each having special features of advantages in particular cases. These joints consist, in each case, of rolled steel flanges placed over the pipes, and being loose thereon before the pipe edge is turned up in the rolls, after which the flanges on two adjacent sections are bolted together with a suitable gasket between the faces of the tubes. This is an ideal construction where the cost and difficulty of transporation do not tell too heavily against it, as the sections cannot then be telescoped on account of the projceting flanges.

Manufacturers can now furnish lap-weled pipes in sections up to one and one-half inches thick; nine feet in diameter and 125 feet long.

As regards friction losses, the Chezy formula is the one most commonly used, and is as follows:

$$v = c\sqrt{s\,r}$$

v Velocity in feet per second;
r Hydraulic radius in feet;
c Variable, depending on roughness s and r;
s Slope.

The roughness depends on the material, its method of manufacture, character of surface, which, again, is influenced by age, velocity, etc. Now, for a circular pipe, r in the above formula becomes $\frac{1}{4}\ d$; and thereupon the formula becomes

$$v = c\tfrac{1}{2}\sqrt{d\,s} \text{ and } s = \frac{4v^2}{c_2 d}$$

c in practice varies from 100 to 150, depending on the conditions mentioned above. The above figures of course refer to conduits of unit lenghth. Numerous tables are published giving friction losses under varying conditions of v, d, etc., which need not be repeated here; but in their use great care should be taken to avoid mistakes which can easily run into cost of five or six figures.

As regards the material, method of manufacture, etc., the following points should receive consideration.

A steel pipe for carrying water is almost invariably coated with asphaltum compound. In applying this coating, the pipe while cold is sometimes dipped into a thick asphaltum mixture, and when the pipe is wthdrawn the coating will drain or collect in a wave-like formation on interior surface, which, after carrying water for a little while, will frequently begin to scale in great flakes causing much uneveness in the interior surface, which resutls in a setting up of eddy currents and a material reduction in the carrying capacity of the line. Where a asphaltum coating is to be applied to the pipe it should be invariably required that this be heated to the proper temperature (which temperature will vary with different mixtures) and the pipe dipped in this and allowed to remain until the pipe has attained the same temperature as the bath. Only by so doing will the mixture properly drain from the pipe after being withdrawn, leaving a smooth, closely adhering coating. The material, before coating, should also be free from rust, and, as far as possible, from oxidation. The process to be pursued in the case of lap-weld (which, by the way, gives it a great asdvantage over sheet steel riveted pipe) is to take the pipe when it comes hot from the welding process, and before the plates have had time to acquire their usual coat of oxide or scale, and while the iron is perfectly clean, to coat them in the hot asphaltum bath, as above described. There are some excellent carbon-base mixtures on the market for cold application, which are usually applied with a brush. After the pipe is riveted up in the trench it should always be touched up, especially at the circular seams, with such a mixture.

(CONTINUED IN NEXT ISSUE)

THE VULCAN IRON WORKS' NEW BUILDING.

Irrespective of whether its property, which nestles at the foot of Telegraph Hill on the west side of Kearny street, between Lombard and Francisco streets, shall be included in the fire limits, it is probable that the Vulcan Iron Works will be given permission to proceed with the erection of a building to have an exterior of galvanized iron to be supported by 14x14 timbers. This is what is known as a slow-burning structure and is considered by the experts as a desirable type.

Restoration of Light Service.

The San Francisco Gas and Electric company report that their generating plants of the Valley company, the Bay Counties company, the North Yuba and the South Yuba, the Folsom, and the Standard Electrical company, are in full operation and able to take care of all business on these lines and furnish all power needed in San Francisco.

Their gas department is now able to furnish seven million feet of gas per day. They are connecting up about 4000 meters per day and increasing their inspection force as fast as competent men can be found. Through the unburned section there were very few services affected by the earthquake.

The buildings of their engineering plant at Fifth and Tehama Sts., San Francisco, now cover nearly half a block. These are used for repair shops and engineers' headquarters.

The Van Emon Elevator Co.

This company has been incorporated with an authorized capital of $1,000,000. The officers and directors are R. J. Davis, president; B. C. Van Emon, vice-president and general manager; H. B. Rathbone, secretary and treasurer; Louis F. Monteagle, W. P. Plummer, George M. Pinckard and A. J. Dibblee, directors.

The office, warerooms and repair shops will be located at the former place, 52-54 Natoma street, San Francisco. A new factory is now being constructed in West Berkeley on a lot 200x175 feet spur tracks from both the Southern Pacific and Santa Fe entering the yard. This factory will be completely equipped to make their own castings. A complete line of the necessary machinery has been ordered from the East, while tools and machines for the repair shop have already been purchased from an establishment at San Jose and are now being placed in the Natoma street shop. It may be mentioned that the only electric elevator running in the burnt district is the Van Emon, in the Atlas Building, 604 Mission street. The officials of the Van Emon company report the outlook for business excellent, orders for new installations having been placed by several parties who have planned buildings and elevators in the course of construction before the fire have been ordered finished.

Hydro-Electric Plants of United States, Canada and Mexico.

Under the title, "Hydroelectric Plants of the United States, Canada and Mexico," Arthur W. Clapp, M. E., E. E., 1164 Monadnock block, Chicago, Ill., will shortly give to the electrical engineering field the first volume of one of the most exhaustive treatments of this branch of the electrical industry that has been published for sometime. Every plant of over 500 horse-power capacity, in the countries covered, will be described with the object of laying before the profession the intimate details of each hydroelectric power plant, its equipment, its location, its purpose and unique features.

The author announces that but few of the plants described in this work have ever appeared in print of any form; and the manner in which the matter is presented in the separate articles will bring the subject vividly before the reader.

The work will be in two or more volumes of 500 pages each. Each plant described illustrated with photographs grouped on one page. The description of the plant gives the following subjects in detail: hydraulic feaures, construction of dam and power house, detail of electrical and switchboard equipment and pole line, each article consisting of from 3,000 to 5,000 words. There are in all about 350 hydro-electric plants of over 500 horse-power in the countries above mentioned. To date, about 250 have been described in the material received.

Accuracy as to data furnished will be the main feature of the work, the statistical matter being furnished by engineers now in control of the individual plants or by those under whom the plant was constructed. Before publication final proofs will be submitted to each company operating the plant described for correction.

This work to the extent of 2,500 copies is to have a free distribution among the electrical engineers in charge of the plants described and to those parties who contemplate the erection of hydroelectiric plants. This distribution is made possible by the co-operation of a number of companies who are interested in the manufacture of hydroelectric equipment. A compilation of this character will be of great assistance as a reference book for years to come, and the author will be pleased to receive any information or statistics that will be of interest to the profession and valuable for publication in these volumes. As there will be an excess of a few copies of this work, Mr. Clapp will furnish gratis a complete set of the volumes to any reputable engineer or company upon appilcation.

Some Building Suggestions.

William S. Wheeler of the Southern Pacific chief engineer's office, wrote to the Committee on Building Ordinance making the following suggestions concerning the construction of buildings:

A proper header and stretcher bond in brick work—namely, English and Flemish bond types.

Fronting of brick work with liquid mortar in every course.

Hoop iron bond, one row in every eight inches of thickness of wall every fourth course.

Would absolutely abolish veneer work both in brick and stone.

A proper application of the mortise and tenon for the fastening of the stud to the top and bottom plates of wooden dwellings and also in other parts of a dwelling where too much dependence is placed on nails and spikes.

SAN FRANCISCO ENGINEERS ORGANIZE.

One hundred structural engineers of San Francisco met on Thursday, May 17th, in the Harbor Commissioners' room at the Ferry Building and perfected an organization for the purpose of adding in the rebuilding of the city. Mr. Lewis A. Hicks presided. Adresses were made by General William Sooy Smith, Prof. Hunt of the University of California, Charles C. Moore, Joseph Sheerer, C. H. Schneider and J. D. Galloway. A sub-committee was appointed to report on the following subjects: Foundations, steel construction and design, fire proofing and steel work, fireproof partitions, material for exterior walls, roof construction, fireproof protection for openings, cornices and firewalls, interior finish, class C construction building ordinances, history and earthquakes.

John D. Galloway said that a new building code had been prepared by the sub-committee of seven which would be submitted to the committee of forty and be presented to the supervisors at their next meeting.

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EDITORIAL.

Lessons From the Fire.

Even at this early date one can look away from the disaster and begin to enumerate the blessings. The silver lining to the cloud is already beginning to rise above the horizon. Despair gives way to hope and even in some degree to congratulation. Sorrow is blotted out by cheerfulness in the improved conditions. Each day the view becomes brighter and when the momentary personal loss and inconvenience has been lost sight of, we will come to a realizing sense of the mercies still remaining and the great opportunity which Providence has set before us.

Not alone as individuals but as a municipality we have reason to look up and take courage. For many years San Francisco has been wrestling with grave problems. Growing up from the small beginning of a mining camp to its proud position of the metropolis of the Pacific Coast, it has never been able to stop long enough in its rapid growth to lay suitable plans for this development.

Consequently in its streets, its parks, its railroad and transportation facilities, its water supply and its buildings, the city has been incomplete and a matter of regret to those acquainted with the possibilities of municipal development.

Now all this is changed. The systems of the past are swept away. The streets desired to be widened are free and unincumbered; the chance is open for improved arteries for freight and passenger traffic by the simple method of diagonal thoroughfares connecting points like the Townsend street station of the Southern Pacific railroad with the ferries; the desirability and advantages of either overhead or underground construction are plainly illustrated; the best methods and materials for fireproof structures are forcibly shown by the steel and reinforced buildings whose walls now remain intact; and the necessity of additional water supply and also contingent and reserve reservoirs for use in case of fires is recognized both by the engineers and our municipal authorities.

In our individual and business life there are also many lessons to be learned—lessons which involve prudence, character, faith and foresight. These lessons have been brought home forcibly to our people, and we believe that in the future, both in our business and personal lives, there will be evidenced the strength and the power growing out of these deep and intense experiences.

Probabilities.

A month has gone by and the vigorous earthquake of Wednesday Apirl 18th, is fast becoming a matter of history. But while the impression of danger grows gradually fainter, it is proper that we ask ouselves, as calmly as possible, what are the probabilities of vigourous quakes in the future?

The people of San Francisco merited the high praise given them by the President of the United States soon after the disaster, not so much for the display of patience and fortitude in calamity, as for the exhibition of pluck shown in the expressed determination to abide in the land, earthquake or no earthquake, and to re-establish themselves where their homes had been for many years. It was this seeming challenge to mighty Nature from feeble man, even while the impress of disaster was fresh, that compelled the admiration of the world.

It is not altogether for ourselves that the question of future earth movements must be considered. There is indeed a comfortable feeling that in the natural order of events this generation will probably not be called upon to experience a shock as severe, or worse than that of April 18th. But there remains the long line of men and women who shall inhabit these parts when we shall have gone, and for their safety and help we must act with wisdom and solve the problem, if it be capable of solution, in advance. We must note with accuracy the innumerable earth tremors which have hitherto escaped attention. The times of transmission of the earth waves, whether through the crust along the surface, or along a chord must be determined so that we may begin to approximately measure the forces involved. Co-seismal lines can be plotted and accurate data kept, and if there be zones of safety, or comparative safety, their limits can be made known. For many years chronological records of earthquakes have been kept in this state. A list from the time of settlement to 1891 was published by Holden when director of the Lick observatory, and since that date records have been kept by the United States Weather Bureau. From these, covering in all a period of sixty years or more, a little comfort may be obtained concerning the probable frequency of severe shocks. From other sources, especially the seismograph records at many stations and the work of eminent men in Japan, certain tentative conclusions may be made. While it is true that as in meteorology no two storms are ever exactly alike, and so no two earthquakes are exactly the same in effect, and to a certain degree each disturbance may be a law unto itself, nevertheless general truths hold. The most prominent of these is that destructive earthquakes, as shown by Omori, occur after a period of comparative quiet and not otherwise. Severe

shocks in California are the exception and not the rule. It will surprise Californians to know that hardly a week passes without a feeble shock. During 1905 there were no less than seventy dates on which earthquakes were reported. As for the number of localities at which they were felt, this runs well into the hundreds every year. They are not confined to any one section of this state. No month of the year is exempt. The earth's crust is in unstable equilibrium and from time to time readjustments must occur. It is wise to remember that in a period of nearly forty years, in which probably not less than five thousand earth movements have been recorded, less than one-half of one per cent. have been vigorous enough to destroy buildings and imperil life.—Alexander G. McAdie.

Brief Interviews With Leading Manufacturers and Dealers on the Present Situation and Prospects.

Electric Appliance Company.—Mr. Hillis states: "We have located and shall remain for one year at 111-121 Townsend Street, San Francisco. We have fifteen carloads of dry batteries, wire of every description, sockets, cutouts, conduits, porcelain and glass insulators, etc., which have just arrived, and we are, therefore, prepared to supply any demand for these articles." Mr. Hillis was in New York at the time of the fire, and, before returning West, he placed orders for forty carloads of electrical goods, almost all of which are now in transit. These shipments include "O. K." weatherproof wire, Paranite rubber covered wire, Hemingray glass insulators, George Cutter line material, Bryant & Perkins goods, Adams-Bagnall arc lamps, Packard lamps, Zenith lamps, Packard transformers, Brunt's porcelain insulators and cleats, telegraph pins and brackets, cros arm braces and pole steps, galvanized conduits, etc. Mr. Hillis reports that all his Eastern manufacturers are giving preference to their orders from San Francisco, and are doing everything in their power to help straighten out the situation here.

Allis-Chalmers Company—The temporary quarters of this concern was not large enough to afford accommodations for their large force of female stenographers, and accordingly Mr. Scribner had erected a large tent for their exclusive use, in front of which he has thought it necessary to place a sign notifying the public at large to "please keep out." The Allis-Chalmers Company have just received two carloads of motors and generators. They also report the following recent sales: Bonanza and Trinity Mining Company, San Francisco, one complete generating station, with equipment for operating the mine by electrical power. S. H. Harmon Lumber Company, San Francisco, one fifty horsepower Bullock induction motor. Diekmann & Co., San Francisco, one complete sawmill equipment. Grove Grain and Milling Company, San Francisco, one 1500 barrel flour mill. Manganese Products Company, San Francisco, one Gates crusher with set of tube mills and crushing rolls.

Electric Storage Battery Company—Mr. Daggett says: "We have just arranged for an Exide sparking battery charging station at the works of the Mobile Carriage Company, Golden Gate Avenue, corner of Gough Street, San Francisco. We have also opened warerooms and repair shops in Oakland. We have now a supply of batteries on hand for delivery and a large stock is en route."

The Wagner Electric Manufacturing Company—"We have just received two carloads of motors and transformers and are now able to fill all orders. We have opened a San Francisco office at 1701 Geary Street for the convenience of those located in San Francisco. We shall, however, retain our temporary office at 404 Twelfth Street, Oakland."

General Electric Company—"We have thirty carloads on the way, which will soon be due, comprising motors, transformers and other electrical supplies. The trade is requested to file orders for this stock as soon as possible, so that we may provide for and supply their wants immediately upon receipt of goods."

California Hydraulic Engineering and Supply Company—Mr. Martin says "We have arranged for a permanent warehouse and salesroom at Seventh and Market streets, Oakland. which will also be our temporary office address. We shall remove our offices, however, to 520 Montgomery Street, San Francisco, as soon as the building now in course of construction is completed. The Kewanee Boiler Company and the Quincy Engine Works are in exceptionally good position to make prompt deliveries of high pressure boilers and Corliss four-valve engines."

Benicia Iron Works—Our factory was considerably damaged yet everything is now in good running order and we are turning out work as rapidly as ever.

Ohmen Engine Company—Our plant was almost destroyed by the fire, but we are now re-establishing. We desire to receive engineering and supply catalogues, which can be addressed to us at Fifteenth and Utah Streets, San Francisco.

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GENERAL WRECKING A SPECIALTY

A Temporary Office of HEALD'S BUSINESS COLLEGE and of HEALD'S SCHOOL OF MINES AND ENGINEERING has been opened at 1451 Franklin Street, S. F. Both schools will be reopened as soon as suitable quarters can be obtained.

Stanley G.-I. Electric Company—Mr. Parker says: "We have received several carloads of goods and have distributed same among our customers. We are in daily receipt of other supplies and can now deliver induction motors and transformers, besides other electrical specialties."

Wellsbach Company—Mr. Thompson says: "Just as soon as we can find quarters in San Francisco we will be prepared to do business on the same basis as previously. In the meantime we are prepared to fill small orders from stock and promise delivery of large orders from our Chicago house, from which we can guarantee prompt delivery and good service. Orders for less quantities than 100 pounds can be delivered from our present stock at East Oakland, Cal."

A. Lietz Company—"We shall rebuild on our old site on Sacramento Street, putting up a four story Class A building which will be devoted entirely to our own business and be the most complete establishment of its character in the United States."

G. E. Witt Company—"We shall be located for one year at our present address in Oakland. We are ready for business, having called in all tne stock we had out on consignment, and can, therefore, fill promptly all orders."

Paraffine Paint Company—The factory of this company was located at Paraffin, Alameda County, across the bay from San Francisco, and was not injured in any way, consequently they can supply their trade as usual.

John R. Cole & Co.—Mr. Cole says: "We have leased a lot 80x100 on the north side of Folsom Street, between Third and Fourth, and will have built for us a one story corrugated iron building which will be thoroughly equipped and ready for our occupancy by June 20th." This is the first move towards the new electrical center of San Francisco.

Smith, Emery & Co.—"Our new modern laboratories were entirely destroyed by fire, but we are opening laboratories on Franklin Street near our present quarters in Oakland. We were fortunate enough to save all of the records and plans belonging to our clients, as well as considerable technical apparatus, which enables us to immediately begin work at our new location."

California Electrical Works — Mr. Scribner and Mr. Wayman both said in concert: "We are fairly flooded with orders, and our Los Angeles office is as busy as the San Francisco house. We have just installed our new electric plant, which enables us to work night and day. This plant consists of a forty horsepower gas engine, which we brought up from Los Angeles by express at a cost of $400. Then we have two generators of twenty kilowatts and thirty kilowatts, which generate enough power for our elevators and machinery, also the light for both inside and outside of our building.

Francis Smith & Co.—"While our office was burned out our factory is practically intact and in rnnning order, so that we are able to fill orders for pipe. water and oil tanks, flues, etc. We intend reestablishing our office at our old address as soon as premises are rebuilt. Meanwhile our temporary office will be at our factory."

Trade Catalogues

Coal Handling Machinery—Coalmen should receive with much pleasure catalogue 063 of the C. W. Hunt Company, which gives much detailed information regarding the cheapest and most efficacious way of handling coal. The question of its loading is so important that any information as to the best way to lighten the cost will assuredly be appreciated.

Fan Motors—The Westinghouse Company has brought out a well printed booklet on fan motors. It is attractively bound and profusely illustrated.

A Device for Central Stations—A clever novelty for central station advertising has just been issued by the Chicago Edison Company, who offer to furnish them in any quantitp desired. It is called "Facsimiles of Important Chaldiac Inscriptions," and what appears to be hieroglyphics, when held to the light reads "Be Wise—Use Central Station Electric Light and Power." The device is copyrighted by the authors, D. H. Howard and H. A. Seymour.

Direct Current Motors—The Stanley G.-I. Electric Manufacturing Company, in its Bulletin No. 601, has a well illustrated paper on the high grade direct current motors and generators manufactured by them. There is in this pamphlet tables of value to purchasers, enabling them to select the size motor or generator best suited to their requirements.

Saw Mill Machinery — The Allis-Chalmers Company, in its bulletin No. 1703, has printed a good deal of valuable fnformation regarding trimmers, slashers and cutting-off saws which will be found valuable to the trade.

Gould's Pumps—The Goulds Manufacturing Company has published a circular in which is set forth advantages of using the pump manufactured by this company. It gives in detail the excellence of this pump and shows what value it is to a fire department.

Gas and Gasoline Engines — The National Meter Company, of New York, has published a little pamphlet upon the Nash gas and gasoline engine which will be found of value to those engaged in business which has to use these engines.

Professional Cards.

Hunt, Dillman, Meredith & Allen, engineers, Contra Costa Water Company Building, Ninth and Washington Sts., Oakland.

Donald C. Jackson, C. E., and William B. Jackson, M. E., electrical, mechanical and civil engineers, Madison, Wis.

H. M. Byllesby & Co. (Inc.), design, construct and operate railway, light, power and hydraulic plants, 171 La Salle St., Chicago.

Edward F. Cannon & Co., electric and hydraulic engineers, 309 McKay Bldg., Portland, Or.

Leon M. Hall, consulting engineer, 814 Hayward Building, San Francisco.

R. S. Masson, consulting engineer, 709 Pacific Electric Building, Los Angeles.

W. Stuart Smith, consulting engineer, 2538 Dwight Way, Berkeley, Cal.

H. C. Thaxter, electrical and mechanical engineer, Atlas Building, 604 Mission Street, San Francisco.

G. F. Wakefield, surveyor and engineer, room 22, Porter Bldg., San Jose, Cal.

Van der Nailen's School of Practical Engineering, Telegraph Ave. and 51st Street, Oakland.

Clem A. Copeland, M. E., consulting and supervising electrical and mechanical engineer, Bradbury Building, Los Angeles, Cal.

Robert McF. Doble, consulting and supervising engineer, San Francisco, Cal., Colorado Springs, Colo.

Mutual Gas and Engineering Company, consulting engineers and builders of gas plants, 202 Union Bank Building, Oakland.

Smith, Emery & Co., chemists and chemical engineers, 1104 Broadway, Oakland.

Rudolph W. Van Norden, consulting engineer, 105 Bacon Bldg., Oakland.

H. J. Neall, consulting electrical engineer, 12 Pearl Street, Boston.

United States Cast Iron Pipe and Foundry Co.
Manufacturers of
Cast Iron Pipe
For Water, Gas, Sewage, Culverts, Drains, etc. In all regular sizes 3-in to 84-in.
General Offices
71 BROADWAY, NEW YORK
Cable Address, Uscipipe, New York
Pacific Coast Sales Office
951 EDDY ST. SAN FRANCISCO.

CALIFORNIA HYDRAULIC ENGINEERING AND SUPPLY CO.
GENERAL MACHINERY DEALERS
"Quincy" Corliss Engines. "Kewanee" Boilers. Stephens-Adamson Transmission Machinery. American Well Works Pumping Machinery.
7th and Market Sts. Oakland

G. E. WITT CO., of San Francisco
Little Giant and Incandescent Oil Burners. Pump Governors. Manufacturer of Brass Goods, Machinery and Supplies.
757 7th Street, Oakland. Phone Oakland 7660

Industrial.

EXTENSIONS TO THE WEST ALLIS WORKS.

The new extensions to the West Allis, Milwaukee, Works of the Allis-Chalmers Company, when completed will add 861,000 square feet to the plant's present floor area of 652,000 square feet and make the entire plant capable of affording employment to 11,000 persons. The extended works, together with the capacities of the other works of the Company in Milwauke, Chicago, Cincinnati and Scranton, will be capable of affording employment to a total of approximatey 18,000 persons.

The general plan of the West Allis Works provides for two sets of building units, one composed of those in which the work is common to every class of product, like to pattern shops, erecting shops and foundry; the other group comprising the machine shop units where the work is specialized for various machine operations. The two groups of buildings lie at right angles to each other; those of general utility lengthwise of the plat, north and south. The machine shops, six units in all, run crosswise of the plat, adjoining the erecting shop at the east end. Facing the ends of the machine shop units Nos. 1 to 6 stands the foundry with its extensions, extending north and south. The pattern storage and shops stand farthest westward in the group and parallel to the foundry, with a span of 98 ft. between them. The extension to the erecting shop, foundry and patern shops are duplications of the existing units in practically every detail of construction.

A NEW INSTALLATION.

The Weed Lumber Company, whose offices are in San Francisco, recently ordered through the San Francisco offices of the Allis-Chalmers Company electrical machinery for installation at Marysville, Cal. The new outfit consists of a 700 kilowatt belted alternator and a small type "B" belted exciter, together with a large number of type "AN" induction motors to be built at the works of the Allis-Chalmers Company, Cincinnati, and ranging from three to seventy-five horsepower each, with a total aggregate of 248 horsepower. The Weed Lumber Company has a total output for approximately 30,000,000 feet of lumber per annum.

SOME RECENT CONTRACTS.

The Canadian Westinghouse Company, Ltd., is being called upon to supply apparatus for the operation of a number of single-phase railway lines. A recent contract is for furnishing their latest type of alternating current single-phase railway equipment for approximately thirty-five miles of track, for the Windsor, Essex and Lake Shore Rapid Railway Company. For the present, five cars equipped with two 100 horsepower motors each, will be operated, in addition to which the order covers a 500 kilowatt single-phase, twenty-five cycle generator to be installed in the new power house near Essex, together with switchboards, exciters and transformers, for operating the system. A trolley voltage of 6500 will be used and the most improved type of catenary line construction will be installed throughout the system.

GASOLINE APPARATUS FOR SOLDERING RAIL-BONDS.

The efficiency of a rail-bond depends so largely on the degree of contact obtained with the rail that even the best bonds must give poor results if not properly installed. Where soldered bonds are used the danger from poor labor is greatly reduced and excellent results can be obtained by employing a suitable soldering device.

It may be recalled that the Pennsylvania Railroad is empoling Thomas soldered rail bonds for its electrified lines on Long Island. To install these bonds, the general contractor, Westinghouse, Church, Kerr and Company, secured over 100 outfits of an improved gasoline rail bond soldering apparatus devised by the Smith Company, of New York. A rail bond soldering outfit of this kind includes a five gallon galvanized iron tank, two ten-foot lengths of armored gasoline hose and a double burner and fittings. A single soldering equipment is made up of the same quantity of material, but the capacity of the tank is three and one-half gallons and but one length of hose and one burner are furnished. These simple and effective equipments are in use in so many other places where soldered bonds are applied that it would be hardly practicable to enumerate them in detail.

The naval appropriation bill, reported to the House recently, authorizes the construction of a concrete drydock at the Puget Sound navy-yard to cost $1,250,000, and appropriated $100,000 to begin its construction.

Westinghouse Electric & Manufacturing Co.

San Francisco Office
1843 FILLMORE STREET
Near Bush Street

Oakland Office 1115 BROADWAY

Address all communications to Oakland office, P. O. Box 616.
Telephone Oakland 7482.

The Town of Palo Alto, Cal., will receive bids for Power Plant Machinery on June 4, 1906.

Specifications may be obtained from JOHN D. BOYD, Town Clerk, Palo Alto.

Allis-Chalmers Co.

San Francisco office
602 MISSION ST., Atlas Building
Ground Floor

Address all mail and make remittances to Oakland office, 906 BROADWAY, Room 21, Second Floor.

TWO CARLOADS OF MOTORS AND GENERATORS JUST RECEIVED

One carload Rock Crushers and Posts and three carloads Corliss Engines en route.

GEO. E. DOW PUMPING ENGINE CO.

Have resumed business at the old stand with office at **179 First Street, San Francisco.** where they have a stock of standard pumps on hand and are now prepared to execute all orders for steam, electric or power pumping machinery, centrifugal pumps, air compressors, etc.

Motor Generator Sets

For Lighting and Power
Built in all Capacities

National Brake and Electric Company
Successors to National Electric Coy., Milwaukee
708 SAN PABLO AVE., OAKLAND
J. FRANK PERRY, Pacific Coast Manager.

OHMEN GAS ENGINE CO.
Now located at
772 NOE ST. SAN FRANCISCO

CHAS. C. MOORE & CO'S LOS ANGELES CONTRACT

The steam power plant to be delivered and installed at Redondo, Cal. will be used for supplying power to the entire street railway system of Los Angeles and the various surrounding towns in connection with the various other plants and water transmission systems. This plant will have a nominal capacity of 15,000 kilowatts consisting of three 5000 kilowatts units; the overload capacity of the plant will be about 30,000 indicated horsepower. The generating units consist of three McIntosh & Seymour combined double horizontal and vertical compound condensing engines, with grid-iron valves, each direct connected with a 5000-kilowatt fly-wheel type General Electric 50 cycle 18,000 volt alternator. Engines will operate under 157 pounds pressure, degrees F. superheat at throttle, and 27-inch vacuum. The engines are fitted with a special equipment of electrical speed-changing devices, and McIntosh patented time-delayed dash pots, to facilitate the synchronizing of alternators and the operation of alternators in parallel under variable load. The division of load between the engine and the speed of each engine will be controlled by the switchboard operator. Each engine has two horizontal high pressure cylinders and two vertical low pressure cylinders, as well as two sets of condensing apparatus, one for each low-pressure cylinder, so that in case of breakdown of either side of any main engine, the other side may be operated under an overload.

Wheeler "Admiralty" surface condensers are to be used thoughout. Connected to each condenser there will be one motor-driven Wheeler centrifugal circulating pump, also one Edwards triplex vertical single-action suction, valveless air-pump, motor driven. The air-pump and circulating-pump motors are supplied with power from an auxiliary generator, or may be operated from the main generator. Each main generator has its independent motor driven exciter. The auxiliary engine and exciter engines are tandem compound noncondensing, supplied by the Harrisburg Foundry and Machine Works. The exhaust steam for the auxiliary engines, together with the various drips and the exhaust steam from the feed pumps, will be used for feed water heating purposes. Steam is supplied by means of eighteen 600-horsepower Babcock & Wilcox water-tube boilers of forged steel construction each boiler having an integral superheater to give 125 degrees superheat at the boiler nozzle when operating between 190 and 200 pounds gauge pressure. Each boiler is equipped with fuel oil furnaces and oil burners. Weber steel concrete chimneys will be used. All high-pressure steam piping will be specially designed with rolled-steel flanges and lap joints.

Chapman gate valves will be used throughout, specially constructed for use with superheated steam. Electrically controlled valves will be used at critical points. On the outlet from each boiler there will be one Pearson automatic angle steam stop and check valve. Oil is supplied to the boiler by means of Snow specially constructed oil pumps and will be heated by means of Goubert multiflow oil heaters. The feed pumps are horizontal duplex compound, outside center packed. The feed water is heated by Goubert vertical multiflow feed-water heaters.

NATIONAL ELECTRIC LIGHT CONVENTION.

In connection with the convention of the National Electric Light Association at Atlantic City, in June, it is proposed to repeat on a more extensive scale the exhibit of central station advertising that was given with so much success last year at Denver for the first time. It is proposed to divide the exhibit into two sections, one showing the work done by the larger companies, which maintain their own force for such work and issue and prepare their own bulletins, and the other bulletins and material furnished by the new concerns that have sprung up lately to supply the smaller stations with this class of matter, many of which have already done very effective work. In addition to this a display will be made of posters, large news paper advertising and the original drawings and sketches employed in the bulletins.

ESATERN ENTERPRISE.

The intense interest felt by the Eastern Houses in the Pacific Coast Market for their goods is illustrated by the presence here of three of the leading men connected with the Western Electric Company. These are C. G. DuBois, secretary of the company; W. R. Patterson, plant engineer, and E. J. Frost, traffic manager. They will all remain for six weeks to two months and will lend their assistance in the upbuilding of San Francisco while, incidentally, co-operating with the California Electrical Works in caring for their Pacific Coast Trade.

Immediate Deliveries from Stock

Our Factory, Warehouse and Offices escaped the recent disaster and we are fully equipped with staple

Stock to Supply all Orders

No advance in Prices
No change in Policy

ALL ORDERS ARE RUSH ORDERS

California Electrical Works

642 FOLSOM ST., S. F.

Pacific Coast Agents
WESTERN ELECTRIC COMPANY

The Pelton Water Wheel Company

Has Temporary Offices at

1259 ALICE STREET
OAKLAND, CAL.

Orders promptly filled from our Eastern Works. New San Francisco plant under construction not burned; will soon be completed.

ELECTRIC RAILWAY MANUFACTURERS' SUPPLY COMPANY

NOW AT

1668 FELL ST. SAN FRANCISCO

BROOKS – FOLLIS ELECTRIC CORP.

Have Opened Temporary Quarters

563 13TH STREET OAKLAND

We are prepared to build water water wheels for all heads of water and power

KNIGHT'S WATER WHEELS

From 2 to 6 feet in diameter and from 10 to 1000 horsepower. Wheels inclosed in iron cases from 6 to 24 inches

KNIGHT & CO., SUTTER CREEK, CAL.

Fulton Iron Works Agents, San Francisco, Cal.

HALLIDIE MACHINE CO.

Seattle 315-317 Second Ave. So. Spokane 302 First Avenue

Can make quick shipments from stock of

Machine Tools, Steam Plant Equipment, Gas Engines. Marine and Stationary Air Compressors, Rock Drills, Pneumatic Machinery, Wood Working Machinery, etc.

Home and Foreign News.

AN IMPORTANT MEETING.

The Colorado Light, Power and Railway Association held a convention at Glenwood Springs recently where several papers were read. The most important were "The Mercury Arc Rectifier," by G. N. Robinson; "A New Efficiency, High Candlepower Incandescent Lamp," by C. B. Mahaffey; "Notes on an Up-to date-Station" by A. M. Ballow; "Getting New Business," by R. L. Goodale; "Isolated Plants," by H. L. Woolfenden, and "The Application of Electric Power to Gold Dredging," by F. F. Dostal. The papers were published by order of the executive committee.

THE TESTING OF TANSFORMERS AND TRANSFORMER IRON.

In an interesetiog paper read in Birmingham, England, on April 25, before the Birmingham local section of the Institution of Electrical Engineers, by D. K. Morris, Ph. D., and G. A. Listre, associate members the authors state that in the testing of transformers, the principal qualities which may have to be investigated are: 1 core losses; 2 copper losses at all loads; 3 efficiency at light loads as well as full load; 4 heating at full load; 5 regulations on all loads and power factors; 6 insulation.

The designer and manufacturer of the transformers may also require to know the extent to which the core loss is caused by hystereses or eddy currents. In addition, it would be useful to determine the excellence of the built-up magetic circuit, having reference to the permeability of the iron and the low magnetic resistance of the joints.

Excellent methods have been proposed for determining most of the above qualities, but it will be found that they involve the use of different and unusual sources of supply, and also of a considerable number and variety of electrical connections and instruments. Thus to separate the core losses a supply is required whose frequency can be varied, while direct current at low voltage is usually employed when finding the copper drop or deriving the temperature rise from the increased resistance of the windings.

In order more quickly and conveniently to carry out these measurements, the authors propose a standard test involving but one set of connections, three instruments, and the normal supply. This method necessitates the use of two similar transformers, and is a modification of that first described in 1892 by Ayrton and Sumpner. It is an application of the Kapp-Hopkinson or differential method of testing direct-current machines.

AN ECONOMICAL PLANT

The power plant of the Lucky Boy mine, in the Blue river district is said to be the most economical for generation of electric ty in the world. Electric energy is said to be produced at less expense because of natural facilities. The plant is at the head of the McKenzie river, eight miles from the mine. It is equipped with machinery of the latest Westinghouse type.

Total cost of operation is about $225 a month. Comparative expense would be even further decreased if the Lucky Boy Mining Company would use its vast surplus power. The capacity of the plant could be increased ten-fold with very little expense. At present 200 horsepower is used and also suppplies the 40-stamp mill with power, and lights a large concentrating plant. It also lights the entire mine underground and about twenty houses, a total of about 500 lights, sixteen and thirty-two candle power.

CABLE SURVEYS.

A very interesting paper by Dr. James M. Flint has recently been published as Bulletin No. 55 of the United States National Museum, which deals with the large number of 2,074 soundings taken in the Pacific ocean for the survey of the route for the telegraph cables between the Sandwich Island the Philippines and Japan, by way of Midway Island and Guam, the line between San Fnacisco and Honolulu having been sounded with satisfactory results previously. In the earlier part of 1899, the U. S. S. "Nero" a steam collier of about 5000 tons, was fitted out for the work and sailed from San Francisco under command of the veteran Captain Belknap, who so far back as 1874 had already greatly distinguished himself in this work. Unfortunately on the ship reaching Manila, Catpain Belknap was seized with illness and had to resign his command to Lieutenant Commander H. M. Hodges.

The total length of the line surveyed was 6,000 miles and the soundings were zigzaged over a belt fourteen milse wide, while complete surface and bottom temperatures were also taken. One of the most interesting results obtained was the discovery of a submerged range of mountains about half way between the Marianne or Ladrone Islands and Midway Island, which rise from a fairly level plain 3,000 fathoms below the surface to within 7000 fathoms in places, and extends over some 200 miles of longitude. To the eastward of Guam very irregular bottom was found, the depths varying from 5,000 and upwards to under 700 fathoms. An abyss, subsequently called "Nero Deep," was struck about seventy-five miles east-southeast of Guam, in which soundings of 5,070, 5,101, 5,160 and 5,269 fathoms were taken. The last named is claimed as the greatest depth ever discovered. Its exact position is given as latitude 12 degrees, 43.3 minutes, north, longitude 145 degrees 49 minutes east. Between the Marianne on Ladrone Islands and Japan, a continuous line of mountains was found connecting these Islands with the Bonin group.

ASBESTOS FIRE-RESISTING ROOFING

And Sidings for temporary and permanent buildings. Affords greater fire-protection and is more easily and quickly handled and will LAST LONGER than galvanized iron. Absolutely waterproof. Guaranteed.

Deliveries made immediately upon receipt of order.

H. W. Johns-Manville Co.

1301 GOLDEN GATE AVENUE

Cor. Fillmore Street, SAN FRANCISCO

John R. Cole & Co.

Pacific Coast Sales Agents for

New York Insulated Wire Co.
The Cutter Company
American Circular Loom Co.
The Bossert Elec. Construction Co.

Have established temporary offices at

Atlas Building, 606 Mission Street

SAN FRANCISCO

SEATTLE ELECTRIC COMPY.

907 FIRST AVE., SEATTLE

Offer Quick Deliveries for Stock of
ELECTRIC GENERATORS
ELECTRIC MOTORS, METERS
TRANSFORMERS, BATTERIES
INSULATORS, ELECTRIC
FIXTURES, ELECTRIC SIGNS
ELECTRIC WIRE, ELECTRIC
HEATING DEVICES, Etc.

THE ELECTRIC STORAGE BATTERY CO.

Temporary Offices

Rooms 1, 2, 3, 525 13TH ST., OAKLAND

Telephone Oakland 7474

SMALL POWER MOTORS.

The Westinghouse Electric and Manufacturing Company lately perfected a line of motors for light power service such as operating sewing machines, dental apparatus, coffee grinders, small ice cream freezers, phonographs, sign flashers, moving window novelties and hundreds of other adaptations. The smaller sizes may be attached to an ordinary incandescent lamp circuit, furnishing a profitable day load for lighting companies. These motors follow closely the design of the well known Westinghouse fan motors and are built for both alternating and direct current circuits, either 115 or 230 volts. The direct current motors are either shunt or series wound for twenty-five, sixty or 133 cycles. The efficiency of all machines is exceedingly high.

The base of the motor consists of a separate casting, the frame being drilled and tapped so that the feet may be fastened in any one of four different positions. This construction adapts the motor for mounting in any position. The screw holes in the base are slotted to allow belt adjustment. A two-step grooved pulley, suitable for a cord or round belt, is supplied with each motor. The speed obtained by driving from the larger step is about twice that of the smaller.

The bearings are self-oiling and similar in construction to those of the fan motors. They are provided with vertical oil cups with a wick which effectually lubricates the shaft, and a suitale return channel prevents the dripping of oil from the bearings.

The leads are brought out through hard rubber busbings, and connection to the motor is easily made. An ordinary lamp cord and plug may be attached to the motor leads for connecting it to an incandescent socket or receptacle.

The alternating current motors are of the single-phase induction type with open end frames and split phase winding, the starting oil of which is automatically cut out as the motor comes up to speed. A self-acting friction clutch engages the load after partial speed has been attained. The direct current motors are enclosed and are supplied either series or shunt wound, and are so constructed that no starting device is necessary.

PIERSON, ROEDING & CO.

Temporary Office. 23 BLAKE BLOCK, OAKLAND
Telephone Oakland 3678
Will locate permanently in Rooms 409-415 MONADNOCK BLDG., S.F., on June 15
Branch Offices: SEATTLE, LOS ANGELES
Successors to JNO. MARTIN & CO. and MARTIN PIPE AND FOUNDRY CO.
PACIFIC COAST AGENTS FOR

LOMBARD WATER WHEEL GOVERNORS
Governors adapted for every possible class of service.

VICTOR INSULATORS
Porcelain and Glass
FOR ALL VOLTAGES.
Made by LOCKE INSULATOR MFG. CO.

FIBRE CONDUIT FOR UNDERGROUND CIRCUITS
Cheaper and better than Tile or Paper.

RAILWAY OVERHEAD MATERIAL
RAIL BONDS
Made by OHIO BRASS COMPANY.

THE PITTSBURG REDUCTION COMPANY
Makers of ALUMINUM WIRE.

Chas. C. Moore & Co., Engineers

(Incorporated)
Temporary Main Office, 3100 WASHINGTON ST., SAN FRANCISCO
Telephone WEST 210
Temporary Branch Office 417 14TH STREET, OAKLAND
Telephone OAKLAND 1284

Now building one story sheet iron structure for main office, on old site, 63 First Street, corner Mission Street, San Francisco, where we will be established within 10 days.

HERCULES GAS ENGINE WORKS

Hoists, Stationary Engines,
Electric Light Engines
Works and Office
Blanding Avenue, nr. Park St. *ALAMEDA, CAL.*
PHONE 91

CALIFORNIA INCANDESCENT LAMP CO.
Have Reopened at
604 MISSION STREET
Ground Floor, Atlas Building, S. F.

GEO. E. CARTER CO.
ROUND RED CEDAR SAWN REDWOOD **POLES**
Temporary office
3637 CLAY ST. SAN FRANCISCO

Abner Doble Company
ESTABLISHED 1850
IRON—STEEL
Temporary Offices
2611 BROADWAY, SAN FRANCISCO
Oakland Branch, 668 Broadway. Telephone, Oakland 585 New works under construction at Seventh and South Streets.

H. G. AYLSWORTH
ELECTRICAL SUPPLIES
Temporary Office:
Cor. CALIFORNIA AND PIERCE STS., S. F

THE ELECTRIC COMPANY
Have Opened
Temporary Offices at
548 SECOND AVE. RICHMOND

NEW FACTORY FULLY EQUIPPED
And ready to help build up GREATER SAN FRANCISCO
Drendell Switchboard Co.
ELECTRICAL MANUFACTURERS
Factory, 17th and Utah Streets, S. F

You Must Have CLEAN BOILERS to Produce CHEAP POWER
DEARBORN FEED WATER TREATMENT will keep the Boilers Clean and at Low Cost
Dearborn Drug and Chemical Works
New York, 299 Broadway SAN FRANCISCO Chicago, Postal Telegraph Building

VAN EMON ELEVATOR CO.

Still at Old Address

46-54 NATOMA STREET

Bet. 1st and 2d Sts.

SAN FRANCISCO

Equipped and Ready for Business

New Lexington High Voltage Porcelain Co.

Manufacturers of

"CROWN" PORCELAIN INSULATORS

C. S. KNOWLES

Sole Sales Agent

BOSTON ATLANTA NEW YORK SAN FRANCISCO.

John A. Roebling's Sons Co.

MANUFACTURERS OF

WIRE and WIRE ROPE, ELECTRIC WIRES, CLOTH and NETTING

Are prepared to take care of orders. Large stocks at Los Angeles, Portland and Seattle; also en route to Oakland.

Temporary office:

1116 BROADWAY OAKLAND

LIMA INSULATORS

THAT STAND THE TEST

High Voltage Transmission Insulators made from the best of Porcelain.

Exclusive Pacific Coast Agents

JOHN A. ROEBLING'S SONS CO.

1116 BROADWAY, OAKLAND

Phone Oakland 7410

ELECTRICAL SUPPLIES AT WHOLESALE.

HOLABIRD-REYNOLDS ELECTRIC CO., 116 East Fifth Street, Los Angeles, representing The Electric Porcelain Co., Tubes and Insulators. Prices on this line have been reduced again. Better see us. Eureka Rubber Mfg. Co., Rubber Insulated Wires and Cables. Franklin Electric Mfg. Co. "Femco" Incandescent Lamps. Weber Electric Co., Weber Sockets. National Code standard. Manufacturers of Switchboards and Tablet Boards.

San Francisco: 305 Atlas Bldg., 604 Mission St.

Luitweiler Pumping Engine

The only Pumping Engine delivering constant stream of water without pulsation. Can be run by gasoline, steam or electric power on same base without belts.

Full descrpiptive Catalogue or Price List mailed on request.

Factory and Office

707-714 NORTH MAIN STREET

LOS ANGELES CALIFORNIA

News Notes.

San Diego, Cal.—The completion of the wireless government station on Point Loma was signalized on May 15, when Chief Electrician Hanscomb of the United States department of wireless telegraphy reported to Admiral McCalla, commandant at Mare sland, the opening of the service. A reply was received from Admiral McCalla congratulating Mr. Hanscomb on completing the undertaking. The electrician not only picked up Mare Island station, but the Farallone Islands, the entrance to San Francisco harbor, and also Point Arguello, near Santa Barbara.

Olympia, Wash.—Articles of incorporation were filed with the Secretary of State of the North Coast Railroad company of Spokane, capital stock $500,000, Robert Strahorn and A. G. Smith, incorporators.

The objects of the corporation are stated to be to construct a line of railroad from Seattle to Spokane, through the counties of King, Pierce, Lewis, Yakima, Benton, Franklin, Adams, Whitman and Spokane, a distance of 350 miles.

New York, N. Y.—John F. Wallace, former chief engineer of the Panama Canal, has been chosen to head a new electric securities corporsoon to be organized.

The new corporation will take over all the stock of Westinghouse, Church, Kerr & Co., and beside conducting a general engineering and construction business through that concern will operate as a holding company for the securities of electrical enterprises.

San Francisco, Cal.—W. P. Fuller & Co., announce that they have enough tonnage on the water and under charter to bring 700,00 barrels of cement to the Pacific coast.

San Diego, Cal.—The first carload of poles to be used in the electrization of the National City and Otay railroad have arrived, and within a short time work on the improvements will be commenced. It is planned to change the motive power of the road from steam to electricity, and on the start wires will be strung from San Diego to Chula Vista. New rails will also be laid and in many other ways the road will be greatly improved.

Tacoma, Wash.—The Pacific Traction Company have begun work on a road to run from Tacoma to American Lake, fourteen miles distant. The Road will be completed and cars running by August 1st.

The John M. Klein Electrical Co.

Have Located Temporarily at

1268 Clay Street Oakland

Will remove shortly to

SAN FRANCISCO

Architects and Contractors

ATTENTION!

We have Oil Furnace 45 feet long, and Bending Floor specially adapted to straightening beams and structural shapes of all kinds. Also very heavy Hydraulic Presses for cold straightening.

WANTED—CAST IRON SCRAP

RISDON IRON WORKS

Office and Works, Potrero.

City Office, Cor. Steuart and Folsom Sts.

LINDSLEY BROTHERS CO.

CEDAR POLES, POSTS, TIES, PILING, CROSS ARMS PINS AND BRACES

Delivered Prices Furnished on Request

SPOKANE, WASH. 427 Peyton Bldg Telephone Main 603

PORTLAND, OR. 336 Sherlock Bldg. Telephone Main 559

Gould Storage Battery Co.

Main Office

1 WEST 347TH STREET

NEW YORK, N. Y.

Works, DEPEW, N. Y.

Temporary address

1701 GEARY ST., SAN FRANCISCO

PACIFIC ENGINEERING CO.

Experting Consulting Designing **ENGINEERS** Superintending Constructing Repairing

Also dealers in Engines, Boilers, Pumps, Valves, Fittings, Packing, Supplies.

Washington St. and Railroad Avenue

SEATTLE

Phones: Main 2990, Ind. 1532.

Standard Electrical Works

We are already well stocked and ready for business in our offices and warerooms on ground floor of

Atlas Building

604 Mission St., S. F.

R. J. DAVIS, President.

THE
Parker Water Tube Boiler
SECURES
GREATER ABSORPTION OF HEAT AND CONSEQUENT ECONOMY

No Wet Steam No Burnt Tubes
No Leaking

PACIFIC COAST AGENTS:
Keystone Boiler Works
SAN FRANCISCO, CAL.

A. S. KEELER & CO.
90 SECOND STREET

Stock on Hand:

Williamson Double Swivel Vise.
Empire Dry Batteries.
Fair Telephones.
Appleton Fuse Wire.

BUILDING INTACT

Kilbourne & Clark Co.

113 MARION ST., SEATTLE

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KODAKS TO RENT
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Portland, Ore.—The recent purchase of the O. W. P. & Ry Co., and a number of smaller concerns in the Willamette Valley by the banking firm of Charles Prati & J. & W. Seligman, of New York, and E. W. Clark & Co., of Philadelphia, who are the owners of the Portland General Electric Comapny, completes a consolidation that has been under way for sometime and which will combine the management of the businesss affairs of all the companies under the same head. It is supposed that H. W. Goode will become the president or actual head of all the companies in the consolidation. This merger is one of the most important combinations of electric and railway property in the United States, and represents a value of upward of $30,000,000. Two million, five hundred thousand dollars will be spent in improvements and enlargements within the next eighteen months. The combined energy in control of the combination will be about 60,000 horsepower, which includes practically all of the electricity now generated within a radius of forty miles from Portland. J. G. Sykes, general superintendent of the Portland General Electric Company has assumed charge of the power plant of the O. W. P. & Ry. Co at Cazadero, and F. S. Drake, assistant general manager of the Portland Railway Company has succeeded George I. Brown, former chief engineer of the O. W. P. Other changes will probably follow.

Seattle, Wash.—The Bates and Clark Company of Seattle, Wash., successors to the Bogart Bates Company, recently contracted with the Allis-Chalmers Company through its Seattle office for electrical machinery to be built at the works of the Allis-Chalmers Company, Cincinnati. The new outfit will consist of a 250-kilowatt water wheel type alternator, sixty cycles, three-phase and 2300 volts; also a small 6-kilowatt tpye B, exciter and suitable switchboard.

Seattle, Wash.—The Hydraulic Manufacturing Supply Company, of Seattle, has secured the contract for all the hydraulic pipe for ditch work to be constructed at Nome this summer.

Seward, Alaska.—The Seward Light and Power Company, Seward Alaska, will install a 225-kilowatt Allis-Chalmers water wheel type generator, a 9-kilowatt belted exciter and a switchboard, recently ordered in the electric light station at Seward, for lighting and power service. The outfit will be built at the company's works in Cincinnati, Ohio.

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READY FOR BUSINESS

Los Angeles, Cal.—The New Broadway, Second Avenue and South Mason street line to Fourteenth Avenue have just been opened.

Portland, Ore.—The Home Telephone Company states that they will require 400,000 miles of copper wire and that their automatic switchboard will cost $300,000.

Burke, Idoho—The Great Western Mining Company will install a three drill compressor and a sixty horse power motor, the plant to be in operation within sixty days.

Spokane, Wash.—Charles P. Lund, promoter of the Spokane, Cheney and Southern railway, which expects to connect Spokane and Cheney by electric line, has returned from Cheney, highly pleased with the outlook for a franchise. Active construction on the line will begin at an early date, with a view to having the road in operation by next fall.

Portland, Ore.—The Pence Company have been granted a franchise to construct and operate a standard gauge double tract electric line on the county road from the west end of Nicolai street to Linnton. Construction must begin within ninety days and the road must be completed within eighteen months. The steel for the track will not be lighter than 60 pounds to the yard.

Portland, Ore.—The Mount Hood Electric Company make an offer which is favorably considered to construct and sell to the city of Portland for $1,250,000, a water power plant, the initial installation of which shall be capable of developing 10,000 horsepower with 15,000 additional horsepower for future additional increase of plant. To install this additional horsepower will cost $400,000. This proposition, if accepted, will enable the city to acquire its own electric lighting plant.

San Francisco, Cal.—As quickly as it gets its men into the field, the United Railroads will start the work of converting all of its cable roads, wherever practicable, into overhead electric roads. Millions of dollars are to be put into this and other improvements decided upon by the owners of the properties. The new franchise provides that their electrical equipment shall be first-class in every particular and shall include highly ornamental poles along Market and Sutter streets, both of which streets shall be lighted electrically without expense to the city. First-class iron poles shall be used in the permanent construction on all said lines and the feed wires shall be carried under ground.

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